Iranian Journal of Microbiology
Volume 8 Number 3 (June 2016) 168-174

ORIGINAL ARTICLE

Emergence of CMY-2- and DHA-1-type AmpC β-lactamases in *Enterobacter cloacae* isolated from several hospitals of Qazvin and Tehran, Iran

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Received: December 2015, **Accepted:** March 2016

ABSTRACT

Background and Objectives: The emergence of plasmid-mediated AmpC (pAmpC) β-lactamases conferring resistance to third-generation cephalosporins has become a major clinical concern worldwide. The aims of this study were to determine the prevalence of pAmpC-producing *E. cloacae* isolates and typing of them in Qazvin and Tehran provinces, Iran.
Materials and Methods: A total of 120 cefoxitin non-susceptible isolates of *E. cloacae* were obtained from educational hospitals of Qazvin and Tehran, Iran. Bacterial identification was performed by standard laboratory methods and API 20E strips. Susceptibility to cefoxitin was determined by Kirby-Bauer disk diffusion method. PCR and sequencing were employed to detect pAmpC families' genes (ACC, FOX, MOX, DHA, CIT and EBC) and the clonal relatedness of pAmpC-positive isolates was evaluated by enterobacterial repetitive intergenic consensus (ERIC)-PCR method.
Results: In total, 20 (16.7%) isolates of *E. cloacae* were positive for presence of pAmpC genes among those bla_{DHA-1} (14.2%) was the most common gene followed by bla_{CMY-2} (2.5%). Results of ERIC-PCR showed that that the prevalence of DHA-1 and CMY-2-producing *E. cloacae* isolates was not due to clonal outbreaks.
Conclusion: In present study, we showed the first emergence of DHA-1 and CMY-2 types of pAmpC-producing *E. cloacae* isolates in Iran. The appearance of pAmpC should be considered as a warning for the implementation of appropriate infection control and therapeutic policies in order to prevent the dissemination of these resistant organisms in our hospital settings.

Keywords: *Enterobacter cloacae*, PAmpC, ERIC-PCR

INTRODUCTION

Enterobacter cloacae is a prevalent opportunistic pathogen which is associated with nosocomial infection in hospital settings (1). The most common causing infections of this organism are the urinary tract, lower respiratory tract, skin and soft tissue, and central nervous system infections (2). The β-lactams are one of the most prescribed choices against bacterial infections (3). β-lactamase production is the major β-lactam resistance mechanism in Gram-negative bacteria, such as *Enterobacteriaceae* and *Pseudomonas aeruginosa* (4). In recent years, emerging of newer β-lactamase enzymes, including extended-spectrum β-lactamases (ESBLs) and AmpC β-lactamases complicates the process of therapy and limits treatment options (4, 5). The extensive and inappropriate use of β-lactam antibiotics are associated with the appearance of these resistant determinants, especially when third-generation cephalosporins are used to treat serious infections (6).

AmpC β-lactamase production is one of the mechanisms of resistance to β-lactam antibiotics in Gram

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